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U.S. PATENT APPLICATION

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Invention: VEHICULAR CONTROL DEVICE HAVING SELF-DIAGNOSIS
FUNCTION AND SELF-DIAGNOSIS PROGRAM FOR IMPLEMENTING
THE SAME

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SPECIFICATION

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**VEHICULAR CONTROL DEVICE HAVING SELF-DIAGNOSIS FUNCTION
AND SELF-DIAGNOSIS PROGRAM FOR IMPLEMENTING THE SAME**

CROSS REFERENCE TO RELATED APPLICATION

5 This application is based on and incorporates herein by reference Japanese Patent Application No. 2000-329026 filed on October 27, 2000.

BACKGROUND OF THE INVENTION

1. Field of the Invention:

10 The present invention relates to a self-diagnosis function of a vehicular control device that controls a vehicle and also relates to a technique for implementing the self-diagnosis function through an object oriented program.

2. Description of Related Art:

15 Recently, the mechatronics technology, which combines the mechanics technology with the electronics technology, has shown the notable progress as a result of the substantial progress in the electronics technology, such as the advent of high performance microprocessors. As a part of the progress in the
20 mechatronics technology, various computer systems have been developed for use in vehicles, such as automobiles. These vehicular computer systems are used to achieve an improvement in resource consumption, energy consumption, running performance, safety, comfort or the like and are provided in
25 various systems, such as an engine system, a drive system, a running/safety system, an entertainment system and the like of the vehicle.

Among the various computer systems, there is a particularly strong demand for a vehicle controlling computer system to achieve high reliability. For example, if the vehicle controlling computer system is not able to detect a malfunction of a particular component of the system, the vehicle may experience a driving trouble or may not be able to continue its driving. To avoid this, one previously proposed computer system has a self-diagnosis function to improve its reliability. Specifically, a diagnosis process is implemented to achieve the self-diagnosis function. In the diagnosis process, operations of a computer unit, various sensors and the like are automatically and periodically checked. Then, if any malfunction is detected, a corresponding malfunction indicator light (MIL) is lighted or flashed to notify a user of the malfunction, and a malfunction code (DTC) is stored in a memory to notify a service person of a damaged component corresponding to the malfunction code. Targets of the diagnosis process include a crank angle sensor, a cam angle sensor, a water temperature sensor and the like. The number of the targets of the diagnosis process reaches about 200 or more. Hereinafter, the targets of the diagnosis process will be simply referred to as "the diagnosis targets".

The present invention relates to an MIL control operation for controlling the MILs in the diagnosis process. The malfunction notification through the MILs provides the user with systematic malfunction information of about 200 or more diagnosis targets through several MILs. Thus, in the MIL control